

Appl. No. 09/652,820  
 Amendment dated April 18, 2005  
 Reply to Non-Final Office Action of January 18, 2005

### Amendments to Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

### Listing of Claims

Claims 1-15 (cancelled).

Claim 16 (currently amended): An image processing method for recovery of a scene structure from successive image data where motion of the scene structure is linear, the method comprising the steps of:

(a) computing rotational motion in the successive image data using rotational flow vectors derived from a set of intensity data collected from the successive image data, where the rotational flow vectors are represented by

$$\underline{\Psi_x = [\nabla I \cdot r^{(1)}(p)] \Psi_y = [\nabla I \cdot r^{(2)}(p)] \Psi_z = [\nabla I \cdot r^{(3)}(p)]}$$

where  $\nabla I$  represents a gradient of the intensity data,  $r^{(1)}$ ,  $r^{(2)}$ ,  $r^{(3)}$  are three-point rotational flows with respect to a pixel position  $p$ ;

- (b) constructing a shift data representation for the intensity data that compensates for the rotational motion in the successive image data;
- (c) decomposing the shift data representation into a motion vector and a structure vector;
- (d) dividing the successive image data into smoothing windows; and
- (e) computing a projection matrix which is block diagonal between different smoothing windows and which is used to recover the scene structure by solving for the structure vector.

Claim 17 (previously presented): The image processing method of claim 16 wherein the shift data representation is decomposed using singular value decomposition.

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Claim 18 (previously presented): The image processing method of claim 17 wherein singular value decomposition is used to compute a rank-1 factorization of  $-\Delta_{CH} \approx M^{(1)}S^{(1)r}$  where  $M^{(1)}$  is the motion vector and  $S^{(1)}$  is the structure vector.

Claim 19 (previously presented): The image processing method of claim 16 wherein the method is iterated until it converges to a reconstruction of the scene structure.

Claim 20 (currently amended): A device-readable medium comprising instructions for performing an image processing method for recovery of a scene structure from successive image data where motion of the scene structure is linear, the method comprising the steps of:

(a) computing rotational motion in the successive image data using rotational flow vectors derived from a set of intensity data collected from the successive image data, where the rotational flow vectors are represented by

$$\Psi_x = [\nabla I \cdot r^{(1)}(p)], \Psi_y = [\nabla I \cdot r^{(2)}(p)], \Psi_z = [\nabla I \cdot r^{(3)}(p)]$$

where  $\nabla I$  represents a gradient of the intensity data,  $r^{(1)}, r^{(2)}, r^{(3)}$  are three-point rotational flows with respect to a pixel position  $p$ ;

(b) constructing a shift data representation for the intensity data that compensates for the rotational motion in the successive image data;

(c) decomposing the shift data representation into a motion vector and a structure vector;

(d) dividing the successive image data into smoothing windows; and

(e) computing a projection matrix which is block diagonal between different smoothing windows and which is used to recover the scene structure by solving for the structure vector.

Claim 21 (previously presented): The device-readable medium of claim 20 wherein the shift data representation is decomposed using singular value decomposition.

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Claim 22 (previously presented): The device-readable medium of claim 21 wherein singular value decomposition is used to compute a rank-1 factorization of  $-\Delta_{CH} \approx M^{(1)}S^{(1)T}$  where  $M^{(1)}$  is the motion vector and  $S^{(1)}$  is the structure vector.

Claim 23 (previously presented): The device-readable medium of claim 20 wherein the method is iterated until it converges to a reconstruction of the scene structure.

Claim 24 (new): The image processing method of claim 16 wherein the projection matrix is a  $N_p$  by  $N_p$  matrix which is defined to annihilate an expression

$$(H^T S^{(1)}) - \Psi w$$

where  $N_p$  is a number of pixels in an image,  $H$  is a matrix which annihilates the rotational flow vectors,  $S^{(1)}$  is the structure vector,  $\Psi$  is a matrix formed from the rotational flow vectors, and  $w$  is a vector selected so as to allow the structure vector to be solved.

Claim 25 (new): The device-readable medium of claim 20 wherein the projection matrix is a  $N_p$  by  $N_p$  matrix which is defined to annihilate an expression

$$(H^T S^{(1)}) - \Psi w$$

where  $N_p$  is a number of pixels in an image,  $H$  is a matrix which annihilates the rotational flow vectors,  $S^{(1)}$  is the structure vector,  $\Psi$  is a matrix formed from the rotational flow vectors, and  $w$  is a vector selected so as to allow the structure vector to be solved.